NOTE: When completing the table, please list only the page number(s) specific to each Roman numeral Section. If an item isn't applicable to the submitted application, please list NA and include a brief reason why it isn't applicable.

I. STAND ALONE DOCUMENT DEMONSTRATING THE NO MIGRATION STANDARD		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Region 6 reviews all aspects of the no migration demonstration during the initial petition review and requests for petition reissuance.		This is the first submittal of a Petition Renewal Request for Sasol Chemicals (USA), LLC Greens Bayou Plant for WDW147 and WDW319 previous approved June 28, 2006.
	1. Incorporate any deficiency responses into one document.	**NA –** First Submittal of Renewal Application. Submittal will be updated as needed during the review process
	a. Required for initial petition submissions.	**NA –** Renewal Application
	b. Recommended for applications for reissuance of a petition.	**NA –** Update of current approved petition. First Submission.

II. PETITION TABLE OF CONTENTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Each application should include a Master Table of Contents located in the front of Volume 1.		**Master Table of Contents:** located in the from of the PDF electronic submittal. Individual table of contents are included at beginning of each Section 1 thru 7.
	1. Listing should also identify the volume number where the topic is located.	Only Oversized figures are contained in Volumes. All other portions of the renewal are submitted electronically.

II. PETITION TABLE OF CONTENTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	2. The subsections contained in each section should be included in the Table of Contents.	**Master Table of Contents** includes subsections down to 5 levels. Individual Section Table of Contents includes subsections.
	3. A list of tables, figures, and appendices should be included in the Table of Contents.	**Master List of Tables, Figures, and Appendices** for **Sections 1-7** included with Master TOC. Individual lists included at beginning of each section.
	4. Adding a Table of Contents for the specific section or appendix to the front of that specific section or appendix in the document is suggested for expediting the review process.	Individual Table of Contents also included at beginning of each individual section **Sections 1 –7** and **Section 3 Appendix 3-6**.
B. Any appendices containing multiple documents should include a content listing to identify the items if they are not individually labeled or tabbed.		**Section 3 Appendices** with multiple documents (**Appendices 3-6 through 3-11**) contain contents listings in the first part of the appendix for ease of review.

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Applicant		
	1. Facility name	**Section 1.2.1 Page 1-10** Sasol Chemicals (USA), LLC
	2. Well numbers and corresponding state UIC permit numbers	**Section 1.2.1 Page 1-10** Plant Well No. 1 (WDW147) Plant Well No. 2 (WDW319)
	3. Addresses	**Section 1.2.1 Page 1-10** Greens Bayou Plant 1914 Haden Road Houston, Texas 77015
	4. Mailing address	**Section 1.2.1 Page 1-10** 1914 Haden Road

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Houston, Texas 77015
	5. Facility and well physical address	**Section 1.2.1 Page 1-10** Greens Bayou Plant 1914 Haden Road Houston, Texas 77015
	6. Telephone and facsimile numbers	**Section 1.2.1 Page 1-10** (832) 783-6400
B. Facility Contact Information		
	1. Person(s) or firm(s) authorized to act on behalf of the applicant during the processing of the application	**Section 1.2.1 Page 1-10** Mr. Randy Shilling
	a. Address	**Section 1.2.1 Page 1-10** Mr. Randy Shilling Greens Bayou Plant 1914 Haden Road Houston, Texas 77015
	b. Phone numbers	**Section 1.2.1 Page 1-10** (832) 783-6400
	c. E-mail address	**Section 1.2.1 Page 1-10** Randy.Shilling@us.sasol.com
C. Include A Signed Certification Statement As Listed In 40 CFR §148.22(A)(4).		
	1. Must be signed and dated following all final revisions to the document	This is the first submittal. Certification statement will be included at the end of the review process
	a. Petitioner may wait to submit until the review process is completed	Petitioner has opted to submit certification once review process is complete
D. Summary of Past Petition Related Approvals		**1.0 Executive Summary pages 1-1 thru 1-4** 1994 HWDIR Petition – Plant Well 1 (WDW147) – Approved December 1994 Addition of Injection Well No. 2 (WDW319) – Approved December 27, 2000 2000 HWDIR Petition – Approved June 28, 2006

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
E. Quality Assurance And Quality Control		
	1. Describe processes used to verify that proper quality assurance and quality control plans were followed in preparing the petition demonstration- 40 CFR §148.21(a)(4)	**Section 1.5.6 pages 1-47 thru 1-48** Each section of the document is prepared by a member of the technical team. Once the section is fully prepared, the Technical Manager will give an initial review followed by an outside "peer" review. Concurrent with the "peer" review, an administrative/editorial review of the working document was made. A final review by the Technical Manager and the document is assembled for client review.
	a. Confirm all referenced tables, figures, appendices, etc., are included in the document	**Section 1.5.7 Pages 1-49 thru 1-52** When the review process is complete, the Master Table of Contents, Master List of Figures, Master List of Tables, and Master List of Appendices is generated and crossed checked with the complete document
F. Elevations		
	1. Clarify what depth reference elevations are used in the document	**Section 1.2.6 page 1-12** Depths are referenced to the original open-hole well log in each injection well and are measured from the drilling rig's Kelly bushing elevation.
	a. Confirm all depths listed include a reference datum	**Section 1.2.6 page 1-12** Depths are referenced to the original open-hole well log in each injection well and are measured from the drilling rig's Kelly bushing elevation.
	2. List the well elevations to allow depths to be converted to other reference depths	**Section 1.3.2 page 1-13** Plant Well 1 (WDW147) KB= 41.0 ft **Section 1.4.2 page 1-16** Plant Well 2 (WDW319) KB = 47.0 ft
G. Consistently Reference Specific Gravity Or Density Values Throughout The Petition.		

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	1. Use a consistent number of decimal places	Sasol Chemicals (USA), LLC maintains the Specific Gravity range of 1.000 to 1.200 at 20 °C. Three decimal points is used throughout the document.
	2. Always provide a corresponding reference temperature(s)	**1.0 Executive Summary page 1-2** Current Approval Condition of 20 °C
	3. Volume weighted density/specific gravity ranges may be requested by facilities that do not inject a significant volume of immiscible fluid	Sasol Chemicals (USA), LLC is **NOT** requesting any changes to the Volume weighted density/specific gravity.
	4. The timeframe for volume weighted density/specific gravity averaging may consist of any of the following	Sasol Chemicals (USA), LLC uses the **three-whole calendar month** timeframe for volume weighted averaging.
	a. Three – whole calendar month	**1.0 Executive Summary pages 1-2** The three-whole calendar month to be calculated by multiplying each day's specific gravity value by that day's injected volume, totaling those values for the previous three-whole calendar month period, and dividing by that three-month injected volume. The three-whole calendar month calculation condition currently exists as Condition No. 4. (Approved June 28, 2006)
	b. Running 90 or 91-day (13 week) period	Not Applicable – Petitioner uses the Three-whole calendar month calculation

IV. UPDATED ADJACENT SURFACE LAND OWNER LISTING 40 CFR§124.10(C)(4)	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Include the names and mailing addresses of the surface owners of the tracts of land adjacent to the plant boundaries.	**Appendix 1-4** A table of surface owners is provided

IV. UPDATED ADJACENT SURFACE LAND OWNER LISTING 40 CFR§124.10(C)(4)	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
B. Provide a map illustrating the location of the adjacent landowner tracts.	**Appendix 1-4** A map of landowners is provided
C. Describe surrounding land usage (farming, industry, residential, etc.).	**Appendix 1-4**

V. PETITION APPLICATION REQUESTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Describe the specifics of the petition.		
	1. Identify the specific wastes and waste codes requested 40 CFR §148.22(a)(1)	**Section 1.1 pages 1-5 thru 1-9** Including a table of Waste Codes.
	2. Specify the well or wells for which the demonstration will be made 40CFR§148.22(a)(1)	**Section 1.1 page 1-5** Plant Well 1 (WDW147) Plant Well 2 (WDW319)
	3. List the specific gravity/density range, injection intervals, end of operations date, injection rates, etc.	**Executive Summary Pages 1-2 Specific** gravity range of 1.00 to 1.20 at 20 ^{o}C **Section 1.2.6 page 1-12** A table of Regulatory Intervals is provided. Frio E&F and Frio A/B/C **Section 1.0 Executive Summary page 1-3** Requested exemption extension to year 2050 **Section 1.3.2 pages 1-13 thru 1-15 for** Plant Well 1 (WDW147) injection rates/volumes etc. **Section 1.4.2 pages 1-16 thru 1-18 for** Plant Well 2 (WDW319) injection rates/volumes etc.
	4. For a reissuance or modification, specify the requested changes from the approved petition	**Section 1.0 Executive Summary page 1-3** Requested exemption extension to year 2050

V. PETITION APPLICATION REQUESTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
B. Clarify if application consists of the containment of waste within the defined injection zone-40CFR§148.20(a)(1)(i), chemical fate demonstration-40CFR§148.20(a)(1)(ii), or a combination of both.		Application is for the containment of waste within the defined injection zone.
	1. If a chemical fate demonstration is requested, additional documentation not covered in this outline will be required to satisfy 40CFR148.	**NA** – no chemical fate demonstration is requested

VI. LOCATION MAPS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Provide a USGS topographical map (1:24000 scales, if available) indicating the plant boundaries and well location(s).		**Figure 1-2** Topographic Map
B. Provide a simple schematic with a scale or distances listed illustrating the plant boundary and surface and bottom hole well locations of all facility disposal wells.		**Figure 1-3** A simple schematic shows relative locations of Injection Wells 1 and 2
	1. Include facility wells completed in other injection intervals (hazardous and non-hazardous)	**Figure 1-3** A simple schematic shows relative locations of Injection Wells 1 and 2

VII. CHARACTERISTICS OF INJECTION FLUID 40CFR§148.22(A)	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Provide a brief summary of the operation or process that generates the injection fluids.	**Section 6.1.1 Pages 6-1 thru 6-2** Plant operations using crude cresylic acids to produce phenol, cresols, xylenols, blends of cresylic acids, and sodium carbonate solution.

VII. CHARACTERISTICS OF INJECTION FLUID 40CFR§148.22(A)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
B. Describe the characteristics of the injection waste stream.		**Section 6.1 –** Wastewater Characterization (and the subsections 6.1.1 to 6.1.9) **Pages 6-1 thru 6-8**
	1. Discuss if the physiochemical nature of the waste streams are such that reliable predictions can be made to satisfy the standards outlined in 40CFR§148.20(a)(1)(i)or 40CFR§148.20(a)(1)(ii)	**Section 6.1 pages 6-1 thru 6-8** Provides a description of the waste streams and processes. Reliable predictions can be made as the waste stream has remained consistent over the past several years.
C. Include a recent waste analysis.		**Appendix 6-1 –** Sasol Chemicals (USA), LLC 2018 Waste Stream Report
	1. Fully describe the chemical and physical characteristics of the subject wastes 40CFR§148.22(a)(2)	**Sections 6.1.1 thru 6.1.5 pages 6-1 thru 6-7 -** provide a detailed characterization of the waste stream. **Appendix 6-1** also provides the 2018 Waste Stream Analysis.
	2. Verify waste codes represent all applicable waste constituents and constituent concentrations do not exceed maximum concentrations used in the demonstration	**Section 6.1.3, Pages 6-3 thru 6-6** Waste codes were approved in the 2000 HWDIR Petition were applicable to the current waste constituents and possible future constituents. **Section 6.3.8, Pages 6-16 thru 6-17** Concentration reduction factor is set at $1x10^{-6}$ for the constituents of concern. **Appendix 6-1 –** shows constituents do not exceed maximum concentrations used in the demonstration.
D. Describe if waste analysis testing performed is accurate and reproducible 40CFR§148.21(a)(1).		**Appendix 6-1** - provides the 2018 Waste Stream Analysis. The waste analysis testing performed is accurate and reproducible. A NELAC certified lab

VII. CHARACTERISTICS OF INJECTION FLUID 40CFR§148.22(A)	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	performs the analysis according to approved methods, and samples are caught at the same location and approximate time frame each year.
E. Clarify if estimation techniques used were appropriate and if EPA-certified test protocols were used, where available and appropriate 40CFR§148.21(a)(2).	**Appendix 6-1** - provides the 2018 Waste Stream Analysis and appropriate EPA-certified test protocols and methods used.

VIII. DISPOSAL WELLS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. General		
	1. Differentiate any plant well numbering system and Class I UIC permit numbers used in the document.	**Section 1.2 page 1-10** Plant Well 1 (WDW147) Plant Well 2 (WDW319)
	2. Provide well location description	**Section 1.3.2 pages 1-13 thru 1-15** for Plant Well 1 (WDW147) **Section 1.4.2 pages 1-16 thru 1-18** for Plant Well 2 (WDW319).
	3. Include latitude and longitude	**Section 1.3.2 pages 1-13 thru 1-15** for Plant Well 1 (WDW147) **Section 1.4.2 pages 1-16 thru 1-18** for Plant Well 2 (WDW319).
	a. Provide and reference a copy of the well's Class I hazardous waste UIC permit and summarize the permit limitations	**Appendix 1-3** provides current UIC permits
	4. Provide relevant elevations (Ground Level (GL) and Kelly Bushing (KB))	**Section 1.3.2 page 1-14** Plant Well 1 (WDW147), GL = 25.0 ft KB= 41.0 ft

VIII. DISPOSAL WELLS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		KB-GL = 16 ft **Section 1.4.2 page 1-17** Plant Well 2 (WDW319) GL = 27.5 ft KB = 47.0 ft KB-GL = 19.5 ft
	5. Define the KB depths to the Confining Zone, Injection Zone, and Injection Interval in the well	**Section 1.3.2 page 1-14** Plant Well 1 (WDW147) Confining Zone: 4,760 ft Injection Zone: 5,135 ft Injection Interval: 6,564 ft (Frio E&F) **Section 1.4.2 page 1-17** Plant Well 2 (WDW319) Confining Zone: 4,758 ft Injection Zone: 5,134 ft Injection Interval: 6,580 ft (Frio E&F)
B. Disposal well design		
	1. Include a detailed well construction and completion history	**Section 5 – Well Construction** **Section 5.1, Pages 5-2 thru 5 -9** WDW147 **Section 5.2, Pages 5-10 thru 5-17-** WDW319
	a. Include sidetracks, abandoned boreholes, or remedial activity	**Section 5 – Well Construction** **Section 5.1, Pages 5-2 thru 5 -9** WDW147 **Section 5.2, Pages 5-10 thru 5-17-** WDW319
	2. Include a wellbore schematic for each well	**Figure 5-1** – WDW147 **Figure 5-2** – WDW319
	a. Consistently reference depths to the referenced elevation	**Section 5.1, Page 5-2** – for WDW147, KB is 16 feet GL and Referenced for entire section. **Section 5.2, Page 5-10** – for WDW319, KB is 19.5 feet GL and Referenced for entire section.

VIII. DISPOSAL WELLS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	b. For legibility, add expanded detail for complex wellbore construction, if needed	**NA** -there is no complex wellbore construction or sidetracks for either WDW147 or WDW319
	3. Provide daily drilling log or details on well recompletions	**NA** -there have been no well recompletions of WDW147 or WDW319
	a. Summarize historical well work	**Section 5 – Well Construction** **Section 5.1.5, Pages 5-4 thru 5 -9** WDW147 **Section 5.2.5, Pages 5-13 thru 5-17-** WDW319
	4. List the depths and describe the specifics of tubular, cement, packers, etc. used in the completion of the well	**Section 5 – Well Construction** **Section 5.1, 5-2 thru 5-9, Table 5-1, Table 5-2, Appendices 5-2 and 5-4** for WDW147 **Section 5.2, 5-10 thru 5-17, Table 5-3, Table 5-4, Appendices 5-2 and 5-4** for WDW319
	5. Provide relevant logs to demonstrate the cement integrity of the well	The most recent RAT Logs are located in **Section 7,** **Appendix 7-2** for Injection Well No. 1 (WDW147) and **Appendix 7-3** for Injection Well No. 2 (WDW319)

IX. MECHANICAL INTEGRITY TESTING-MIT	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Include a copy of the most recent mechanical integrity demonstration (RAT and annulus pressure test) for each well included in the application 40CFR§148.20(a)(2)(iv).	**Section 7.0 – Mechanical** Integrity for WDW147 and WDW319 completed in 2018.

IX. MECHANICAL INTEGRITY TESTING-MIT		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	1. Demonstrate mechanical integrity of a well's long string casing, injection tubing, annular seal, and bottom hole cement	**Section 7.2.1, Pages 7-2 thru 7-3** WDW147 **Section 7.3.1, Pages 7-4 thru 7-5** WDW319
	2. Confirm that all injected fluids are entering the approved injection intervals and that no fluids are channeling up out of the injection zone near the wellbore.	**Section 7.2.1, Page 7-3 -** WDW147 **Section 7.3.1, Page 7-5 -** WDW319
	a. Operators may be required to conduct a radioactive tracer survey (RAT) with multiple slug chases between the packer and injection interval to document casing integrity and no loss of fluid above the completed interval.	**Appendix 7-2** – WDW147 **Appendix 7-4** – WDW319

X. OFFSET WELL(S)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Provide a complete list of all facility disposal wells including other well classifications or wells completed in other intervals.		**NA** – Sasol Chemicals (USA), LLC Greens Bayou only has the two disposal wells identified in this petition renewal.
B. Describe all pressure sinks and sources in the same injection zone located within a minimum 10 mile radial distance from the facility.		**Section 2.4 page 2-58** Oil and Gas Operations in the Greens Bayou Plant Area. Offset Class I and Class II wells near Sasol are discussed in **Section 3.4.14, Pages 3-60 to 3-67.**
	1. List all offset oil and gas production from the injection interval	**Section 2.4 page 2-58** Oil and Gas Operations in the Greens Bayou Plant Area. ***NOTE:*** there is no production from the injection intervals

X. OFFSET WELL(S)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	a. Provide well completion information or general field information	**Section 2.4 page 2-58** Oil and Gas Operations in the Greens Bayou Plant Area. ***NOTE:*** there is no production from the injection intervals
B. Describe all pressure sinks and sources in the same injection zone located within a minimum 10-mile radial distance from the facility.		**Section 2.4 page 2-58** Oil and Gas Operations in the Greens Bayou Plant Area. Offset Class I and Class II wells near Sasol are discussed in **Section 3.4.14, Pages 3-60 to 3-67.**
	2. List all offset injection wells completed in the same injection interval (Class I and Class II)	**Section 3.4.1 page 3-11 and 3-12** Additional underground injection control facilities that may affect disposal at the Sasol Chemicals (USA) Greens Bayou Plant: Equistar Plant Well 1 (WDW036) [historical injection only]; Lyondell Plant Well 1 (WDW148) and Plant Well 2 (WDW162); Exxon Mobil Plant Well 1 (WDW397) and Plant Well 2 (WDW398); Arkema Plant Well 1 (WDW122) and Plant Well 2 (WDW230); Vopak Plant Well 1 (WDW157); Texas Molecular Plant Well 1 (WDW169) and Plant Well 2 (WDW249); Geospecialties Inc. Plant Well 1 (WDW222) and Plant Well 2 (WDW223); and

X. OFFSET WELL(S)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Shell Plant Well 1 (WDW172) and Plant Well 2 (WDW173) [historical injection only] Additionally, several Class II saltwater disposal wells that may affect disposal at the Sasol Chemicals (USA), LLC Greens Bayou Plant are: Cobra Operating Texas Northern Railway #6; Etoco Jackson-Peace Unit 1; Etoco Destec 2D; Columbus Willits 1; and Columbus Davis OU 2V SWD
	a. Provide well completion information and wellbore schematics	**Appendix 3.6.14** provides well completion and workover data for the Class I offset injection wells. **Appendix 3.6.5** provides wellbore schematics for the Class I injection wells
	3. Provide a map illustrating the location of sinks and sources	**Figure 3-1** provides a general map showing the locations of the Sasol Chemicals (USA), LLC Greens Bayou and Plant Injection Wells, the Area of Review Boundary, and nearby offset injection wells.
	4. Provide cumulative volumes for the sinks and sources completed in the injection interval	**Appendix 3.6.15** includes injection volumes for these offset injection wells.
	a. Include supporting documentation for reported volumes	**Appendix 3.6.15** includes injection volumes for these offset injection wells.

X. OFFSET WELL(S)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	b. Address oil, gas, or water production from producing wells	**Section 2.4 page 2-58** Oil and Gas Operations in the Greens Bayou Plant Area are not expected to have an impact of the lateral plume movement
C. Support the general area reviewed for pressure sinks or sources based on volumes and reservoir transmissibility.		**Section 3.7.1.3**-Pressure Distribution in the AOR using all wells in the area and near area.
	1. Include any modeling or analytical calculations, if applicable	**Section 3.7.1.3 page 3-91** A conservative transmissibility of 245,833.3 md-ft/cp is used to model the operational pressure buildup in the Frio A/B/C Sand Injection Interval. A conservative transmissibility of 444,444.4 md-ft/cp is used to model the operational pressure buildup in the Frio E&F Sand Injection Interval. All offset injection wells in the Lower Frio section are included in the modeling. **Section 3.4.14** – Contain injection rates and discussion from plant wells and offset wells in the modeling.
D. Identify the source or potential sources of the pressure sink in under pressured injection intervals.		**Section 3.4.1 page 3-11 and 3-12** Additional underground injection control facilities that may affect disposal at the Sasol Chemicals (USA), LLC Greens Bayou Plant are: Equistar Plant Well 1 (WDW036) [historical injection only];

X. OFFSET WELL(S)	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	Lyondell Plant Well 1 (WDW148) and Plant Well 2 (WDW162); **E**xxon Mobil Plant Well 1 (WDW397) and Plant Well 2 (WDW398); Arkema Plant Well 1 (WDW122) and Plant Well 2 (WDW230); Vopak Plant Well 1 (WDW157); Texas Molecular Plant Well 1 (WDW169) and Plant Well 2 (WDW249); Geospecialties Inc. Plant Well 1 (WDW222) and Plant Well 2 (WDW223); and Shell Plant Well 1 (WDW172) and Plant Well 2 (WDW173) [historical injection only] Additionally, several Class II saltwater disposal wells that may affect disposal at the Lyondell Chemical Company, Channelview Plant are: Cobra Operating Texas Northern Railway #6; Etoco Jackson-Peace Unit 1; Etoco Destec 2D; Columbus Willits 1; and Columbus Davis OU 2V SWD All offset injection wells in the Lower Frio section are included in the modeling. These intervals are normally pressured.

XI. INJECTION HISTORY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Report and document historical injection into the injection interval to date.		**Appendix 3.6.15** presents historical injection volume data for the Sasol Injection Wells
	1. Site specific	**Appendix 3.6.15** presents historical injection volume data for the Sasol Injection Wells
	2. Offset wells	**Appendix 3.6.15** presents historical injection volume data for the Offset Injection wells
	3. Oil and gas injection, enhanced recovery, or disposal wells	**NA –** There is no oil and gas operations within the injection interval
B. Provide and reference a summary table for the volumes injected into each modeled disposal well, including offset wells.		**Tables 3-13 and 3-14** presents the projected injection volume inputs into the model to year-end 2050. Tabulated historical injection volumes are included in **Appendix 3.6.15.**
	1. List the volumes using the timeframes input into the model	**Section 3.4.14 pages 3-60 thru 3-67** provides the waste disposal history **Tables 3-13 and 3-14** presents the projected injection volume inputs into the model to year-end 2050. Tabulated injection volumes are included in **Appendix 3.6.15**.
	2. Include a column in cubic feet per day for verification of SWIFT input, if applicable	**NA** – DuPont Deepwell Model is used
C. Based on historical injection, justify the maximum rates modeled during the operational period.		**Appendix 3.6.15** presents historical injection volume data for the injection and offset injection wells. **Appendices 3-7 thru 3-11** provides modeling input and output files. Modeled future rates are discussed in **Section 3-5, Pages 3-68 to 3-77** and

XI. INJECTION HISTORY	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	the discussion of how applied within the model

XII. UNDERGROUND SOURCE OF DRINKING WATER (USDW) DETERMINATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Define the depth to the lowermost USDW.		**Section 2.5, Pages 2-59 thru 2-60** **Figure 2-40 -** Base of the USDW on a structure map (3-ohm-m Resistivity) **Appendix 2-11 –** discussion of the methodology
	1. Explain how this depth was determined	**Section 2.5, Pages 2-59 & Appendix 2-11** Determined by log analysis of Lyondell Well No. 1 (WDW148) and a formation resistivity of 3 ohms Determined to be 3,110 feet (log depth) for WDW147. **Appendix 2-11** – determination of the USDW.
	2. Provide logs, equations, and computations, if relevant	**Appendix 2-3** Annotated Logs for Plant Well 1 (WDW147) and Plant Well 2 (WDW319). **Appendix 2-11** – determination of the USDW.

XIII. Regional Geology		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Discuss the regional geology		**Section 2.2 – Pages 2-2 thru 2-24 –** discussion on regional geology
	1. Describe the stratigraphy, depositional environments, tectonic history, and structural geology	**Section 2.2 – Pages 2-2 thru 2-24** provides a description of the stratigraphy, depositional environments, tectonic history, and structural geology
	a. Include a geological stratigraphic column	**Figure 2-1** presents a geologic stratigraphic column
	b. Include supporting documentation i.e., maps, cross-sections, etc.	**Figures 2-1 thru 2-22-** Figures associated with regional geology **Appendix 2-1** – Cambe Regional Map **Appendix 2-2** – Regional Earthquake Data
B. Discuss the regional hydrogeology		**Section 2.2.2, pages 2-12 thru 2-13** provides a description of regional aquifers and aquicludes
	1. Describe aquifers and aquicludes	**Section 2.2.2, Pages 2-12 thru 2-13** provides a description of regional aquifers and aquicludes
C. Seismicity		**Section 2.2.4, Pages 2-14 thru 2-24** provides a discussion of seismicity
	1. Include a listing of historical seismic activity in the regional area (at least a 100 square mile area around the injection well(s)	**Section 2.2.4, Pages 2-16 thru 2-20** Discussion on historical earthquakes in Texas **Appendix 2-2 –** Listing of Earthquake data within 200 miles of the facility
	a. Data should include intensity levels (using an international scale) and distances from the injection facility	**Appendix 2-2 –** Listing of Earthquake data within 200 miles of the facility.
	b. Provide a risk assessment of induced seismicity due to injection activities based on a known induced seismicity formula	**Section 2.2.4.1, Page 2-20** **Figure 2-20 and Table 2-1** provides a risk assessment of induced seismicity

XIII. Regional Geology		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Appendix 2-2 – Listing of Earthquake data within 100 miles of the facility.

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Provide a detailed description of the local geology.		**Section 2.3, Pages 2-25 thru 2-57** provides a discussion of the local geology
	1. Local geologic area should extend a minimum of 1 mile past the extent of the 10,000-year composite waste plume	**Section 2.3, Pages 2-25 thru 2-57** **Figures 2-23 thru 2-33** Defines the area. Maps and sections include the predicted area of the long-term plumes
B. Include and reference a type log defining each of the following intervals.		**Figure 1-4 –** WDW147 with Regulatory Intervals **Figure 1-5 –** WDW319 with Regulatory Intervals **Appendix 2-3** – Type Logs for WDW147 and WDW319
	1. Confining zone	**Figure 1-4 –** WDW147 with Regulatory Intervals **Figure 1-5 –** WDW319 with Regulatory Intervals **Appendix 2-3** – Type Logs for WDW147 and WDW319
	2. Injection zone	**Figure 1-4 –** WDW147 with Regulatory Intervals **Figure 1-5 –** WDW319 with Regulatory Intervals

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Appendix 2-3 – Type Logs for WDW147 and WDW319
	a. Containment interval	**Figure 1-4 –** WDW147 with Regulatory Intervals **Figure 1-5 –** WDW319 with Regulatory Intervals **Appendix 2-3** – Type Logs for WDW147 and WDW319
	b. Injection interval	**Figure 1-4 –** WDW147 with Regulatory Intervals **Figure 1-5 –** WDW319 with Regulatory Intervals **Appendix 2-3** – Type Logs for WDW147 and WDW319
C. Include an updated commercial structure map on the most applicable reference datum available.		**Appendix 2-1** - Cambe Regional Structure Map
	1. Compare with the local geologic interpretation and discuss any anomalies	**Appendix 2-1** - Cambe Regional Structure Map. Discusses the local geologic interpretation No Anomalies
	2. Clarify if any geologic features illustrated on the commercial map are relevant to the no migration application	**Appendix 2-5 thru 2-9** – address the Clinton Dome which is relevant to the application.
	a. Address the vertical and horizontal extents of faults, if applicable	**Section 2.3.4, Pages 2-42 thru 2-57** addresses faulting
D. Confining Zone		**Section 2.3.2.1, Pages 2-26 thru 2-29** discusses the confining zone
	1. Define a confining zone located above the injection zone 40CFR§148.21(b)	**Section 2.3.2.1.1, Pages 2-26 thru 2-28** defines the confining zone
	2. Demonstrate the following for the Confining Zone 40CFR§ 148.21(b)(2)	**Section 2.3.2.1, Pages 2-26 thru 2-29** provides information about the confining zone
	a. Thickness	**Section 2.3.2.1, Pages 2-26 thru 2-27**

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		state that the thickness of the Upper Confining Zone is approximately 380 feet thick **Figure 2-27-** Isopach Map of the Anahuac thickness **Appendix 2-3 –** Type Logs
	b. Porosity	**Section 2.3.2.1, Pages 2-26 thru 2-28** Porosities for the Anahuac shales are expected to be approximately 23 percent.
	c. Permeability	**Section 2.3.2.1, Pages 2-26 thru 2-28** Vertical permeabilities (to brine) measured from two conventional core samples from the Anahuac Formation were 1.8 x 10^{-9} D and 5.9 x 10^{-9} D.
	d. Areal extent and lateral continuity	**Section 2.3.2.1, Pages 2-26 thru 2-29** **Figure 2-26 and 2-27** discusses areal extent and lateral continuity. **Figure 2-27-** Isopach Map of the Anahuac thickness and coverage in site area.
E. Injection Zone		**Section 2.3.2.2, Page 2-29**
	1. Demonstrate each of the following for the various strata in the injection zone 40CFR§148.21(b)(1)	**Section 2.3.2.2, Page 2-29** provides information about the Frio Formation Injection Zone
	a. Thickness	**Section 2.3.2.2, Page 2-29** The Injection Zone extends from 5,135 feet to 7,410 feet, referenced to Plant Well No. 1 (WDW147) **Appendix 2-3** – Type Logs
	b. Porosity	**Section 2.3.2.2, Page 2-31 thru 2-33** Frio E&F **Section 2.3.2.2, Page 2-33 thru 2-35**

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Frio A/B/C
	c. Permeability	**Section 2.3.2.2, Page 2-32 to 2-32** Frio E&F **Section 2.3.2.2, Page 2-33 thru 2-35** Frio A/B/C
	(i) Include available core data and core analysis	**Section 2.3.2.1, Pages 2-26 thru 2-28 and** **Appendix 3.6.9**- Core Reports
	(a) Site specific, offset wells, area wells, or applicable literature references	**Section 2.3.2.3, Pages 2-30 thru 2-37**
	d. Areal extent	**Section 2.3.2.3, Pages 2-30 thru 2-37**
	e. Free of transecting, transmissive faults or fractures to prevent the vertical movement of fluids 40CFR§148.20(b) or (c)	**Section 2.3.4 pages 2-42 thru 2-57** provides information about faults and fractures.
	2. Provide available seismic lines to delineate the local structure of the injection zone if there is a lack of well data at the required depth	**N/A**
	3. Containment Interval	
	a. Identify the strata within the containment interval of the injection zone that will confine fluid movement above the injection interval 40CFR§148.20(b)	**Section 2.3.2.2 page 2-29 -** Underlying the Anahuac Confining Zone is a series of alternating sands and shales of the middle and upper Frio (60 percent shale in the interval), which form an effective Containment Interval in the Injection Zone.
	(i) Discuss lithology and mineralogy	**Section 2.3.2.3 page 2-36 to 2-37**- discusses the lithology and mineralogy of the containment interval.
	b. Show the containment interval is free of known of vertically transmissive faults or fractures 40CFR§148.20(b)	**Section 2.3.4.1 pages 2-42 thru 2-45** presents evidence that the containment interval is free of know vertically transmissive faults or fractures.

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	4. Injection Interval	**Section 2.3.2.3, Pages 2-30 thru 2-37**
	a. Demonstrate each of the following for the injection interval of the injection zone 40CFR§148.21(b)(1)	
	(i) Areal extent and lateral continuity	**Section 2.3.2.3 pages 2-30 thru 2-37** presents information about the Frio E&F and the Frio A/B/C sands injection intervals. **Figures 2-29, 2-30, 2-31 -** Isopach maps continuity in the area.
	(ii) Provide appropriate structure and isopach maps	**Figures 2-29, 2-30, 2-31 –** Isopach maps **Figure 2-33 –** Structure Map on E&F
	b. Thickness	**Section 2.3.2.3** **Page 2-31** The Frio E&F sand interval is approximately 225 feet thick **Pages 2-33 & 2-34** The Frio A/B/C sand interval is approximately 375 feet thick. Isopach maps **(Figures 2-29, 2-30, 2-31)** show thickness in the area.
	(i) Base on several criteria, i.e., logs, isopach, cross-sections	**Figures 2-24 and 2-25 –** Cross Sections **Appendix 2-3 and Appendix 2-4** present cross section annotated logs
	5. Porosity	**Section 2.3.2.3 Page 2-31** **"**Petrographic analysis of sidewall core samples from Injection Well No. 1 (WDW147) for the Frio E&F Sand shows the sand to be a very fine- to medium-grained, silty to clean sand with porosities ranging from 27.6 percent to 34.0 percent"

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Core data presented in **Section 3**, lab reports included in **Appendix 3-6.9**
	a. Base on several criteria, i.e., logs, core data, core analyses, literature, interference tests, etc.	**Section 2.3.2.3, Pages 2-30 thru 2-37, Tables 2-3 and 2-4** literature, X-ray Diffraction Results for the Lower Frio and Chemical Analysis of the Lower Frio Formation Fluids Core data presented in **Section 3**, lab reports included in **Appendix 3-6.9**
	6. Permeability	**Section 2.3.2.3** **Page 2-33** E&F Sand The average inter well permeability is 1,700 millidarcies **Page 2-35**A/B/C Sand The average interwell permeability from the high-quality tests is 1,133 millidarcies Core data presented in Section 3, lab reports included in **Appendix 3-6.9**. Injection/falloff tests data presented in **Section 3.4.5** and Historic Falloff Tests for each well in **Appendix 3.6.13 and Table 3-3**
	a. Include available core data and core analysis	**Section 2.3.2.3, Pages 2-30 thru 2-37, Tables 2-3 and 2-4** literature, X-ray Diffraction Results for the Lower Frio and Chemical Analysis of the Lower Frio Formation Fluids. Core data presented **in Section 3**, lab reports included in **Appendix 3-6.9**. Injection/falloff tests data presented in **Section 3.4.5** and Historic Falloff Tests for each well in **Appendix 3.6.13 and Table 3-3**

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	(i) Site specific, offset wells, area wells, or applicable literature references	**Appendix 3.6** provides area well data; key literature in **Appendix 3.6.18**. Core data presented in **Section 3,** lab reports included in **Appendix 3-6.9.** Injection/falloff tests data presented in **Section 3.4.5** and historic tests presented in Tables **3-3 and 3-4**, data included in **Appendix 3-6.13**
	(ii) Refer to model input parameters	**Section 3.0 – Appendices 3-7 thru 3-11** provide model input parameters.
	b. Hydraulic gradient 40CFR§148.21(b)(3)	**Section 3.7.2.3 pages 3-101 to 3-103** provides information about the hydraulic gradient in the Sasol Greens Bayou area.
	(i)Provide appropriate literature references or calculations	**Appendix 3.6.18** provides key literature for modeling as referenced
	(a) Reference gradients from pressure tests, if applicable	**Section 2.3.4.1 Page 2-44** **"**Original formation pressure measurements for the Miocene-aged injection interval sands beneath the DuPont La Porte Plant (three wells completed into Fleming Group sands), located approximately nine miles southeast of the Channelview Plant, show initial pressure gradients in the range of 0.455 psi/ft to 0.460 psi/ft. These gradients are substantially higher than the pressure gradients measured in the Frio at the Sasol Plant, which are on the order of 0.435 psi/ft"

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Historic static bottomhole pressure pressures are presented in **Appendix 3-6.12**
F. Geologic Maps		**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40 Appendix 2-8 and 2-9**
	1. Include the following general features on structure, isopach, and base maps	**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40 Appendix 2-8 and 2-9** present Cross Sections, Isopach and Structure Maps including: the Anahuac Marker, the Anahuac Formation Confining Zone, the Vicksburg Marker, the Frio D, Frio E&F and Frio A/B/C Sands. Appendices contains maps and figures for Clinton Dome
	a. Map scale should be 1" to 2000'	**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40 Appendix 2-8 and 2-9** map scales at 1" = 2,500 feet to fit standard plotter paper.
	b. Outline the facility and AOR boundaries	**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40** included on maps **Appendix 2-8 and 2-9**
	c. Include appropriate legends, title blocks, and labeling	**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40** included on maps **Appendix 2-8 and 2-9**
	(i) Wells not deep enough to penetrate the mapped datum should be designated as such, e.g., NDE	**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40 Appendix 2-8 and 2-9** -Identified as NDE

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	(ii) Wells with no logs available should be designated as such, e.g., NA	**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40** **Appendix 2-8 and 2-9** -Identified as NL
	d. Confirm the unique artificial penetration (AP) numbers are legible	**Figures 2-23, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40** **Appendix 2-8 and 2-9** well map identification numbers on maps
	(i) Expand portions of the map, if needed , for high well density areas	**Appendix 2-8 and Appendix 2-9** cover the Clinton Dome Area
	2. Structure maps should be based on applicable geologic datum's	**Figures, 2-26, 2-28, 2-33, and 2-40** **Appendix 2-8** present Structure Maps including: the Anahuac Marker, the Vicksburg Marker, Frio E&F and Structure Map for the Base of the USDW – datum is mean sea level.
	3. Isopach maps should show areal extent and continuity of the specified intervals	**Figures 2-27, 2-29, 2-30, 2-31, 2-32,** **Appendix 2-9** present Isopach Maps including: the Anahuac Formation Confining Zone, Frio E&F and Frio A, B, and C Sands
	4. Illustrate cross-section lines on all maps or include and reference a separate cross-section index map that illustrates the wells included on all cross-sections	**Figure 2-23** – Cross Section Location map **Figures 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-40** Cross section lines on all maps **Appendix 2-8 and 2-9**
G. Cross-Sections		
	1. Include a minimum of two structural cross-sections perpendicular to each other that extend beyond the 10,000-year waste plume areas	**Figure 2-24** – NW-SE Structural Cross Section **Figure 2-25** – SW-NE Structural Cross Section
	a. Include additional mini-cross-sections over specific regions to demonstrate	**Appendix 2-5 –** Clinton Dome Cross Sections and Logs

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	specific geologic features, i.e., the extent of a fault	
	(i) Include stratigraphic cross-sections based on a reasonable marker, if correlations are difficult	**Appendix 2-6** – Stratigraphic correlations of the Injection Intervals in Area of Review **Appendix 2-7** – Stratigraphic correlation of the Injection intervals to Clinton Dome
	2. Include the following on each cross-section	**Figures 2-24, 2-25** **Appendices 2-5, 2-6, and 2-7**
	a. Legend and title block with date last updated	**Figures 2-24, 2-25** **Appendices 2-5, 2-6, and 2-7** Title block in lower right
	b. Small scale map showing the cross-section line	**Figures 2-24, 2-25** **Appendices 2-5, 2-6, and 2-7** Map line of section included on figures.
	c. Top and bottom of applicable intervals, i.e., injection interval, injection zone, confining zones, USDW, etc.	**Figures 2-24, 2-25** **Appendices 2-5, 2-6, and 2-7** regulatory intervals presented on figures
	d. Document perforations or completion information, if relevant	**Figures 2-24, 2-25** **Appendices 2-5, 2-6, and 2-7** Well completion information included
	3. At a minimum, include the well name, artificial penetration (AP) number, operator, well status, total depth, KB elevation for each log posted on the cross-section	**Figures 2-24, 2-25** **Appendices 2-5, 2-6, and 2-7** Well information included above each geologic log
	4. Scale the cross-section so the depth scale is legible	**Figures 2-24, 2-25** **Appendices 2-5, 2-6, and 2-7** depth scale included

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	5. Include and reference a copy of the actual logs included on the cross-section as an appendix	**Appendix 2-4** **Appendix 2-5** **Appendix 2-6** **Appendix 2-7** includes cross section well logs (PDF)
H. Reservoir Dip		
	1. Clarify if a variable structure or constant dip will be used for the no migration waste plume demonstrations	**Section 3.4.12.1 pages 3-51 thru 3-53** presents information on structural dip rate.
	a. Constant dip	**Section 3.4.12.1, Page 3-51** "In order to be conservative, a constant dip rate of 230 feet per mile is employed in the long-term High Specific Gravity Plume Model"
	(i) Justify the average dip angle used in the demonstration	**Section 3.3.5 pages 3-8 to 3-10** provides justification for the average dip angle. Variable structure included in long-term modeling.
	(a) Describe or illustrate on a map where and what depths were used	**Figures 2-26, 2-28 and 2-33** presents structure maps.
	(b) List the equations and variables input to calculate the average dip angles	Long-term plume variable dip code (.lcl files) discussed in **Section 3.4.12.1.**
	(ii) Variable dip	Long-term plume variable dip code (.lcl files) discussed in **Section 3.4.12**.1.
	(a) Clarify what structure map was used for the model input	**Figures 2-26, 2-28 and 2-33** presents structure maps. And are discussed in **Section 3.4.12.1 pages 3-51 thru 3-53**

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
I. Provide a sufficient number of well logs to document the structural depths and thicknesses on the structure and isopach maps		**Appendix 2-4** Cross Section Well Logs **Appendix 2-5** Clinton Dome Cross Section Logs **Appendix 2-6** Stratigraphic Correlation Logs in the AOR **Appendix 2-7** Stratigraphic Correlation Logs to Clinton Dome
	1. More data may be required for certain areas if correlations are difficult or unique geologic features exist	**Appendix 2-4** Cross Section Well Logs **Appendix 2-5** Clinton Dome Cross Section Logs **Appendix 2-6** Stratigraphic Correlation Logs in the AOR **Appendix 2-7** Stratigraphic Correlation Logs to Clinton Dome
J. Provide fracture gradient calculations and maximum surface pressure limitation.		**Section 2.3.3.1, Pages 2-40 thru 2-41 and Table 2-5** calculated to be a gradient of 0.81 psi/ft

XV. GEOCHEMISTRY AND INJECTED WASTE COMPATIBILITY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Describe the geochemical conditions of the well site 40CFR§148.21(b)(5).		
	1. Include the physical and chemical characteristics of the injection zone and the formation fluids in the injection zone	**Section 2.6 pages 2-61 thru 2-66** presents hydrogeologic compatibility. Formation fluid characteristics presents in **Section 3.9** and analytical data included in **Appendix 3-6.1**
B. Discuss the compatibility of the injected waste with the injection zone.		**Section 2.6.1 pages 2-61 thru 2-62** presents Waste Stream-Injection Interval Compatibility

XV. GEOCHEMISTRY AND INJECTED WASTE COMPATIBILITY	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
C. Provide an analysis to demonstrate if the waste will adversely alter the confining capabilities of the injection and confining zones.	**Section 2.6.2 pages 2-63 thru 2-64** provide discussion on confining aquicludes. No adverse reactions expected.
D. Discuss compatibility with well construction.	**Section 5.3.7, Pages 5-23 to 5-24** presents waste compatibility with materials of well construction

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Initial and current hydrostatic pressure in the injection zone 40CFR§148.21(b)(4).		
	1. Provide a summary table that lists all historical shut-in pressures for wells completed in the injection interval(s)	**Appendix 3-6.12** provides a tabulation of all static pressures corrected to reference depth.
	a. Compare with the initial static pressure assigned for the no migration demonstration	**Section 3.4.7 pages 3-24 to 3-25** provides comparison of the static pressure assigned for the no migration demonstration.
	2. Discuss how the initial reservoir pressure was selected based on the available data	**Section 3.4.7 pages 3-24 to 3-25** Discussion on the Initial Reservoir pressure and reference depths.
	a. Include all reference data needed to verify selected pressure value	**Appendix 3-6.12** provides historical static pressure measurements **Appendix 3-6.13** – provides Injection/Falloff test data
B. Transmissibility		
	1. Provide and summarize available historical pressure transient testing, i.e., drill stem tests,	**Section 3.4.5 pages 3-17 to 3-21**

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	falloffs, injectivity, interference, pulse, etc., to support the injection interval transmissibility values used in the no migration demonstrations	**Table 3-3** present transmissibility and mobility information from injection/falloff and interference test
	a. Provide electronic copy of pressure transient tests for site specific and offset wells, if available	**Appendix 3-6.13** – provides Injection/Falloff test data for WDW147 and WDW319
	b. Include summary report, tables, and figures of pressure transient reports	**Tables 3-3 and 3-4** present measured reservoir test data. Reports included in **Appendix 3-6.13.**
	(i) Hard copy of recorded pressure and time data not necessary if plot of data is provided	**Appendix 3-6.13** Contain the PDF test copies of all the falloff tests. Bookmarked and searchable
	c. High and low end transmissibility used in the demonstrations should be reasonably conservative based on available data	**Section 3.4.5 pages 3-17 to 3-21 and Table 3-3** Frio A/B/C Sand: "In order to be conservative, in the prediction of pressure buildup, a transmissibility of 331,944 md-ft/cp is used…" **Page 3-18** Frio E&F Sand: "In order to be conservative, in the prediction of pressure buildup, a transmissibility of 444,444 md-ft/cp is used…" **Page 3-19**
C. Effective Net Thickness		
	1. Discuss the selection of a conservative net thickness	**Section 3.4.4 pages 3-15 to 3-16** discusses layer thickness used for modeling computations.

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	a. Pressure buildup demonstration	**Section 3.5.1, Pages 3-68 to 3-71** demonstrates the operation pressure model.
	b. Plume migration demonstrations	**Section 3.5.2, Pages 3-71 to 3-73** demonstrates the operation plume model.
	2. Include and reference copies of all criteria on which the net thickness values are based, i.e., logs, isopachs, cross-sections, historical temperature log summary and plots, seismic lines, literature, well tests, RATs, flow profile surveys, etc.	**Figures 2-24 to 2-31, 2-35 to 2-39, Appendices 2-3 and 2-4** **Figures 3-3 to 3-5** **Appendix 3-6.2a 3-6.2b, 3-6.13** **Appendices 7-2 and 7-4** Provide the requested information
	3. Demonstrate how the selected effective net thickness values are conservative based on all available data	Interval thicknesses discussed in **Section 3.4.4 and 3.5.**
	a. Provide and discuss all historical temperature survey results	Compilation of historic temperature surveys included in **Appendix 3-6.12**
	(i) Include a composite illustration of the temperature logs from the confining zone through the injection zone	Compilation of historic temperature surveys in each well included in **Appendix 3-6.2a**
	(ii) Discuss and address any temperature anomalies	**NA** – No temperature anomalies
	b. Provide copies of the RAT and flow profile surveys for the past 5 years	The 2018 tracer surveys are contained **in Appendices 7-2 (WDW147) and 7-4 (WDW319).** Tracer Surveys for 2017, 2016, 2015, and 2014 are contained in **Appendix 3-6.2b**. Flow profiles are not run in either well
	(i) Discuss how the fill depth and slug chase results were considered in the net thickness determination	**Section 3.4.4 pages 3-15 to 3-17** discusses layer thickness used for modeling computations.
D. Effective Permeability		

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	1. Referencing the transmissibility and effective net thickness discussions, identify a low and high range of permeability values	**Table 3-1** identifies the high and low range of permeability values
	a. Discuss the effective permeability used in the pressure buildup demonstration	**Section 3.5.1, Page 3-68 to 2-71** Frio E&F Sand: "The Frio E&F Sand is modeled as a 150-foot layer with a permeability of 1,600 millidarcies and a viscosity of 0.54 centipoise (transmissibility of 444,444.4 md-ft/cp) in the DuPont Multilayer Pressure Model." **Page 3-70** Frio A/B/C Sand: "The Frio A/B/C Sand Injection Interval is conservatively modeled as a 150-foot layer with a permeability of 885 millidarcies and a viscosity of 0.54 centipoise (transmissibility = 245,833.3 md-ft/cp) in the *DuPont Multilayer Pressure Model"* **Page 3-69**
	b. Discuss the effective permeability used in the plume migration demonstrations	**Section 3.4.5.2, Pages 3-19 to 3-20** discusses the effective upper-end permeability used in the plume migration demonstrations.
	2. Compare selected effective permeability values with available permeability data from pressure transient tests, core data, literature, etc.	**Section 3.4.5** presents permeability values used in the operational and long-term modeling (as well as **Section 3.5**). **Appendix 3.6.9** presents core data for the injection wells.

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Table 3-1 presents modeling input parameters
	3. Describe how the selected effective permeability values are conservative based on all available data	**Section 3.4.5 pages 3-17 to 3-21** presents how effective permeability values are conservative
E. Reference Temperatures		
	1. Designate a surface reference temperature for the requested specific gravity or density range of the waste stream	**Section 3.4.9.3 , Page 3-36** "Sasol conservatively uses the fluid specific gravities at the laboratory reference temperature of 60 ^{o}F in the long-term model calculations."
	2. Specify a reservoir temperature of the injection interval and corresponding reference depth	**Section 3.4.9., Page 3-32 to 3-33** discusses the temperature associated with the reservoir. Model reference depths are presented in **Section 3.4.7.**
	a. Include support documentation to verify the reservoir temperature selection, i.e., a plot of the recorded temperatures versus depth from area well logs, temperature surveys, etc.	**Appendix 3.6.2** presents reservoir temperature with depth for the injection wells and contains temperature survey data.
F. Density or specific gravity values		
	1. Density or specific gravity values should have a minimum of two decimal places consistently used throughout the document, including the modeling	**Section 1.0 - Executive Summary page 1-2** " A running three-whole calendar month volume weighted specific gravity range of 1.00 to 1.20 at 20 ^{o}C" Three decimal points is used throughout the document.
	a. Two decimal places are recommended	**Section 1.0 - Executive Summary page 1-2** " A running three-whole calendar month volume weighted specific gravity range of 1.00 to 1.20 at 20 ^{o}C"

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Three decimal points is used throughout the document.
	b. Precision used in the model should be equivalent to the precision of the requested range	Measuring equipment and procedures discussed in **Appendix 6-2**
	2. Specific gravity values should have temperature references for both the injectate and reference fluid, e.g., 60°F/60°F	**Section 3.4.9.3 , Page 3-36** "Sasol conservatively uses the fluid specific gravities at the laboratory reference temperature of 60 ^{o}F in the long-term model calculations."
	3. Density values should have a single temperature reference	**N/A –** Specific Gravity Used
	4. Provide any calculations used to convert density or specific gravity values at surface conditions to reservoir conditions or vice versa	**Section 1.0 - Executive Summary page 1-2** " A running three-whole calendar month volume weighted specific gravity range of 1.00 to 1.20 at 20 ^{o}C" Three decimal points is used throughout the document.
	5. Provide conversion calculations for input into models, e.g., conversion of density range to lb/ft^3 for input into SWIFT	**N/A –** DuPont Model Used
	6. Formation brine	
	a. Document how the density or specific gravity of the formation brine was selected and state the corresponding reference temp.	**Section 3.4.9.3,Pages 3-35 to 3-38 Appendices 3.6.1 and 3.6.4** Specific gravity of the formation fluid and the injectate
	b. Include copies of all available formation fluid analyses	**Appendix 3.6.1** contains formation fluid samples
	c. Explain how equivalent solutions, i.e., NaCl, etc., were determined, if applicable	**N/A**
	7. Injectate	

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	a. State requested density/specific gravity range of injectate &corresponding reference temps.	**Section 3.4.9.3,Pages 3-37** "Specific gravity of the injectate fluid is measured at a reference temperature of 20 °C" The calculated three whole-month volume weighted specific gravities (also shown on **Figure 3-8**) have historically fallen well within the requested range of 1.000 to 1.200 at 20 °C.
	b. Include/discuss copies of injectate analyses	**Appendix 6-1** presents injectate sample analyses; **Appendix 6-3** Specific gravity data and computation.
	c. Explain how equiv. solns. determined, if applicable	**N/A**
G. Viscosity Values		
	1. Specify/document the reservoir fluid/injectate viscosities used in the no migration demonstrations	**Section 3.4.9.2 pages 3-33 to 3-35** "Viscosity for the injection intervals utilized in the operational models is summarized in **Table 3-6.**
	a. Explain how equiv. solns. were determined, if applicable	**N/A**
	b. Include copies of any monographs, tables, or references used	**Appendix 3.6.3** presents a Density Nomograph. **Appendix 3.6.4** presents a Viscosity Nomograph.
H. Compressibility		
	1. Document rock/fluid compressibility used in demo	**Section 3.4.8 pages 3-25 to 3-32** presents the Compressibility documentation. Fluid compressibility is fixed in the DuPont Models.

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	2. Provide appropriate references, interference tests, etc. used to obtain the rock/fluid compressibility	**Section 3.4.8 pages 3-25 to 3-32, Appendix 3.6.13 and 3.6-18,** presents appropriate references, interference tests, etc. used to obtain the rock/fluid compressibility
I. Porosity		
	1. Clarify the porosity value used in the demonstration is conservative based on porosity discussion included in geology portion	**Section 3.4.6 pages 3-21 to 3-24** presents Porosity. "To be conservative in the modeling of both pressure buildup and plume transport, a conservative effective porosity of 27 percent is assigned the Frio A/B/C Sand Injection Interval and the Frio E&F Sand Injection Interval **(Table 3-5)**This reduction in porosity is used to account for dead-end pores and other complexities in the pore system." Core data is contained in **Appendix 3-6.9**
J. Concentration Reduction Factor (CRF)		
	1. Provide a table listing the CAS number, applicable waste codes, health based limit, maximum concentration, resulting CFR for ea. Waste constituent, if applicable	**Section 3.4.11.3, Pages 3-50 to 3-51 Table 3-10** present a table evaluating waste constituents.
	2. Use 1×10^{-12} CRF and only include a list the waste constituents w/less than 100% concentration	**Section 3.4.11.3, Pages 3-50 to 3-51** "Sasol has modeled a worst-case constituent at a concentration reduction factor of 1 x 10-12 to delineate the plume boundaries (lateral and vertical)." **Table 3-10**
K. Background Gradient		

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	1. Document the regional background gradient in feet/yr. and direction of movement	**Section 3.4.12.2 pages 3-53** **Appendix 3-6.18** Literature data shows ...” that background velocities in the deep subsurface, in general, and in the Frio in particular, are generally less than 1.0 feet/year. To provide a greater margin of safety, Sasol uses a conservative value of 1.62 feet/year as the maximum expected background velocity in the lower Frio.”
	a. Include any references, calculations etc.	**Section 3.3.5, Page 3-9** “Natural background drift velocity is determined from Darcy’s law and the measured hydrodynamic head gradients near the injection site.”
	2. Clarify background gradients used in no migration demo	**Section 3.5.4 and Tables 3-17 to 3-18** Gradient used in low and high specific gravity modeling presented
	a. Don’t use background gradient when modeling plume movement opposing gradient	No gradient used in low specific gravity modeling **(Section 3.5.4)**
	b. Use max. or reasonably conservative value to est. plume move. in direction of background gradient.	**Section 3.5.4** **Section 3.4.12.2 pages 3-53** Maximum 1.62 ft/yr gradient used in high specific gravity modeling
L. Dispersivity		
	1. State longitude and transverse dispersivities used in demo	**Section 3.4.10 pages 3-38 to 3-44**
	2. Provide calc. and appropriate references to support the values selected	**Appendix 3.6.18** provides references to support values selected
M. Diffusion Coefficient		

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	1. Document diffusion coefficients used to model waste plume move., if applicable	**Section 3.4.11.1 and 3.4.11.2 pages 3-47 to 3-50, Table 3-9, and Appendix 3-4** provides information and a calculation example for a diffusion coefficient
	a. Include applicable doc., references or portion of references to support the assigned free water diffusivity coefficients	**Section 3.4.11.1 and 3.4.11.2 pages 3-47 to 3-50, Table 3-9, and Appendix 3-4** provides information and a calculation example for a diffusion coefficient
	2. Provide a table listing the diffusion coefficient for each waste constituent or reasonably conservative value selected for the vertical diffusion demo	**Table 3-9 -** Modeled free Water and Effective Shale Diffusivities for Constituents of Concern.
N. Include equations, calc., and reference docs. To justify other model input parameters used in the no migration demo, i.e., well index, hydraulic conductivity, etc.		**Appendix 3-1 thru 3-5 –** methodology of the DuPont Models **Appendix 3.6** – Determination of Model Input parameters
	1. Include calc. for SWIFT parameters, e.g., RAQ, DMEFF, etc., if applicable	**NA** – DuPont Models Used

XVII. MODEL SELECTION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Keep models as simple as practical		Dupont Models Used
	1. Analytical calculations can typically be used for the heavy plume demo	**Section 3.3, pages 3-3 thru 3-10** discussion of Modeling "philosophy" and description of the Models
	2. Constant dip and constant thickness models are preferred	**Section 3.3, pages 3-3 thru 3-10** discussion and description of the Models

XVII. MODEL SELECTION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
B. Describe the numerical and analytical models used in the no migration demo		**Analytical models used in this Renewal Application.**
	1. Clarify what model is used for which portion of the demo	**Section 3.3, pages 3-3 thru 3-10** describes the models used for the demonstration: *DuPont Basic Plume Model* *DuPont Multilayer Pressure Model* *DuPont Vertical Fluid Permeation Model* *DuPont Molecular Diffusion Model* *DuPont 10,000 Year Waste Plume Model*
	2. Specify the version of modeling software used, if applicable	**N/A**
C. Provide verification and validation for any predictive models used in the demo 40CFR§148.21(a)(3)		**Appendices 3-1 to 3-5** provide verification and validation of the predictive models used in the demonstration. Verification/Validation provided by DuPont.
	1. Include or reference specific documentation	**Appendices 3-1 to 3-5** provides documentation on models used for demonstration. Verification/Validation provided by DuPont.
D. Provide the applicable equations used by any analytical models		**Appendices 3-1 to 3-5** provides applicable equations used by the analytical models.
E. Describe how the model is appropriate for the specific site, waste streams, and injection conditions of the facility operations		**Section 3.3, pages 3-3 thru 3-10** Describes how the model is appropriate for the specific site,

XVII. MODEL SELECTION	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	waste streams, and injection conditions of the facility. Model strategies are discussed in Section 3.5.
F. Describe how the model was calibrated prior to use for predicting pressure buildup or plume movement	**Section 3.3.2 page 3-5 and Section 3.6 pages 3-78 to 3-87** The model is calibrated so the calculated model pressure overmatches the wells' measured bottomhole flowing and/or shut-in pressure history. Insufficient information available for plume calibration.
G. Clarify the solution method used by the model and discuss appropriateness of the method selected, if applicable	**Section 3.3, pages 3-3 thru 3-10** Discusses solution method and appropriateness of the method selected **Appendices 3-1 through 3-5** – also backup information on the DuPont Models

XVIII. PRESSURE BUILDUP MODELS	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. EPA R6 accepts both analytical soln. models and SWIFT for pressure buildup modeling	**Analytical Models Used** – DuPont Model Package

XVIII. PRESSURE BUILDUP MODELS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	1. If an analytical soln. model is submitted for pressure buildup demo:	DuPont Multilayer Pressure Model
	a. Include validation/verification discussion satisfying 40CFR§148.21(a)(3) and compare the model w/another widely accepted analytical model such as PanSystem or hand calc. such as those provided in SPE Monograph 5 Appendix C	**Appendices 3-1 to 3-5 and the DuPont Model Validation** (1999) provide verification and validation Verification/Validation provided by DuPont.
	b. If the petition pressure buildup demo involves fault boundaries, the validation/verification info should address this as well	**Appendices 3-1 to 3-5 and the DuPont Model Validation (1999)** provide verification and validation addressing faults using image wells. Verification/Validation provided by DuPont.
	2. If the SWIFT model is used, include one of the following:	**NA** - DuPont Models Used
	a. Include a SWIFT sensitivity run w/larger grid to confirm the pressure buildup demo result is reasonable or doesn't change w/larger grid. This would address grid limit concerns	**NA** - DuPont Models Used
	b. Include a supporting analytical calc. to confirm SWIFT results	**NA** - DuPont Models Used
Note: The sensitivity model run(s) (SWIFT and/or analytical calc.) would also address requirements for sensitivity analysis under 40CFR§148.21(a)(6)		**Section 3.8 page 3-117** provides a sensitivity analysis for the operational modeling.

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Clarify all timeframes contained in the demo.		
B. Initialization period, if applicable		**N/A**-Analytical Models Used- DuPont Model Package
	1. Run the model for a sufficient time to show model stability	**N/A**-Analytical Models Used- DuPont Model Package
	2. Demonstrate no background gradient is generated by the model input for zero background gradient modeling	**N/A**-Analytical Models Used- DuPont Model Package
	3. Verify the appropriate background gradient exists for the heavy plume model	**N/A**-Analytical Models Used- DuPont Model Package
	4. Demonstrate background velocities present prior to injection in variable structure or variable thickness models	**N/A**-Analytical Models Used- DuPont Model Package
	a. Illustrate or map the magnitude background velocities	**N/A**-Analytical Models Used- DuPont Model Package
C. Historical Period		
	1. Include all historical injection from wells completed in the modeled injection interval	**Section 3.4.14 –** historical injection from offset wells and plant wells in injection interval. **Appendix 3.6.15** includes historical injection volumes from wells completed in the modeled injection intervals.
	2. Include historical production, if applicable	**N/A**
D. Modeled Operational Life		
E. Run the model for the requested operational life		**Section 3.7 pages 3-88 to 3-116 and Section 3.9 page 3-118 to 3-119** The Flow and Containment modeling package modeled two time frames under the modified conditions: 1) The end of 2050 (near future, based on maximum injection data). 2) A 10,000-year post-closure period

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	1. Use the maximum requested injection rates	**Section 3.7.1.1 and 3.7.1.2, Pages 3-88 to 3-90** For the Frio E&F Sand Injection Interval and the Frio A/B/C Injection Interval, all historical injection and future injection at the maximum injection rate of 750 gpm is considered from year-end 2017 through year-end 2050.
	a. 10,000-year demo.	**Section 3.7.2 pages 3-110 to 3-114** presents information on Post-Injection (10,000-year) Waste Distribution **Appendix 3-5 –** additional model information on 10,000-year demo
	2. Buoyant plume	**Page 3-76** "…the *DuPont 10,000 Year Waste Plume Model* is isothermal and the model uses the difference in specific gravity (or density) to produce the driving force for buoyant plume movement, not the actual numerical values."
	a. Do not include an opposing regional background gradient to maximize plume movement	**Sections 3.4.12.2, page 3-53 and 3.5.4 page 3-77** - No background gradient used in low specific gravity modeling.
	3. Heavy plume	**Page 3-76 to 3-77** "…Due to density effects, modeling results have shown that high specific gravity effluent plumes, like those that may be injected at the Greens Bayou Plant site, will in fact tend to

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		"sink", moving deeper into the subsurface…", "
	a. Include background gradient, if in the down dip direction	**Section 3.4.12.2 , Page 3-53** Literature data shows ..." that background velocities in the deep subsurface, in general, and in the Frio in particular, are generally less than 1.0 feet/year. To provide a greater margin of safety, Lyondell Chemical Company uses a conservative value of 1.62 feet/year as the maximum expected background velocity in the lower Frio. "
	b. Facilities that can demonstrate the lack of potential for future oil and gas development in vicinity of inj. well facility, /geol. environment, lack of structural trap, in area of inj. well facility, Region 6 requires min. 200 yr. heavy waste plume demo w/appropriate background gradient (EPA HDQTRS policy assuming oil/gas production will cease w/i 200yrs)	**Section 3.5.5 Page 3-77** "This area has been penetrated by multiple oil and gas test wells, which have found no hydrocarbons in the lower Frio section. It is unlikely that any additional testing would find hydrocarbons in the lower Frio. Therefore, it is appropriate to evaluate the High Specific Gravity Plume over a shorter time span. A conservative time period of 200 years is chosen for the evaluation period."
E. Run the model for the requested operational life		
	(i) Wells located w/i the heavy plume and outside the cone of influence(COI),lack a mechanism for waste to migrate vertically upward making the shorter demo sufficient to demo that waste will not migrate vertically upward in an abandoned well for 10,000years	**Section 3.5.5, Page 3-77** "Formation pressures will have decayed and no Cone of Influence capable of driving effluent out of the injection interval is present well within this 200-year time period. Therefore, after 200 years, there will be no driving force to move the High

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Specific Gravity Plume to shallower intervals."
F. Modeled Boundaries		
	1. Clarify what type of outer boundary conditions were implemented on all sides of the model grids and document the appropriateness of the selected boundary	**Figures 3-11 and 3-19** demonstrate the "sealed fault" and "open fault" boundary conditions. **Section 3.4.13 pages 3-5 to 3-60** presents "Geologic" boundary conditions.
	2. Describe any no flow boundaries input in the model and what the boundaries represent, i.e., symmetry, fault, pinch-out, etc.	**Section 3.4.13 pages 3-5 to 3-60** "Case One – Sealed Fault A Case" models present "no-flow" boundaries for: The Renee-Lynchburg Field Fault located south and southeast of the Sasol Greens Bayou Plant and Clinton Dome located northwest. Potential Sand Shale-out boundaries: Frio B Sand thins to the west of the Plant. These potential flow restrictions are considered in modeling.
	a. Describe how no flow boundaries were input in the model	**Section 3.4.13,Page 3-54 and Appendix 3-6.16 and 3-6.17** In the Case 1 models, the implicit no-flow infinite fault boundary option available within the DuPont Models is employed to automatically generate appropriate image wells on the other side of the boundary.

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	(i) Document the number and location of image wells was sufficient, if applicable	**Section 3.4.13.2.1 Page 3-56 and Appendix 3.6.11, also** **See above Results presented in Figures 3-11 and 3-14** "For approximating no-flow boundaries in the DuPont models, a trial-and-error approach was taken to find the rates and locations of image wells that would approximate estimated actual boundaries using the *DuPont Basic Plume Model*. When the image well was correctly placed at the correct rate, none of the streamline particles from the actual injection well would cross the desired no-flow boundary. Likewise, none of the streamlines from the image wells cross the no-flow boundary."
G. Document the modeled injection rates for all wells included in demonstration, including production wells if appropriate		**Section 3.4.13.2.1 Page 3-56, also** **See above Results presented in Figures 3-11 and 3-14** "For approximating no-flow boundaries in the DuPont models, a trial-and-error approach was taken to find the rates and locations of image wells that would approximate estimated actual boundaries using the *DuPont Basic Plume Model*. When the image well was correctly placed at the correct rate, none of the streamline particles from the actual injection well would cross the

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		desired no-flow boundary. Likewise, none of the streamlines from the image wells cross the no-flow boundary."
	1. Historical period	**Appendix 3.6.15** provides Historical Injection Volume Data
	a. Provide qtrly inj. reports for most recent five-year history	**Appendix 3.6.15** provides Historical Injection Volume Data
	b. Provide annual inj. volumes for six plus year well histories	**Appendix 3.6.15** provides Historical Injection Volume Data
	c. More rigorous inj. data can be provided and used, if desired	**Appendix 3.6.15** provides Historical Injection Volume Data
	2. Requested operational period	**Tables 3-13 and 3-14** present projected cumulative injection rates for Frio A/B/C and Frio E&F Sands
	3. Area or offset well rates during post-operational period, if applicable	**NA –** all injection ceases at year-end 2050
H. Address any area geologic features		
	1. Clarify what geologic features are included in each demo (pressure buildup, plume, etc.)	**Section 3.4.3 pages 3-13 to 3-15** presents the Geologic input parameters required for the no migration demonstration modeling. Boundaries are presented in **Section 3.4.13.**
	2. Clarify how the geologic features are included (image wells no flow boundary, etc.)	**Section 3.4 pages 3-13 to 3-15** presents Model Input Data and Sources. Boundaries are modeled via image wells as presented in **Section 3.4.13.**
	3. Provide sufficient documentation for exclusion of any geologic feature, i.e., analytical calc. showing no impact on pressure buildup	**NA**

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
I. Document the assumptions used in low density waste plume demo		**Section 3.5.5, Page 3-77**
	1. Low-end of the density range compared to formation fluid	**Section 3.5.5, Page 3-77** "The Low Specific Gravity Plume is lighter than the formation fluid and will move up-dip (north-northwest) from the plant due to buoyancy effects." Fluid properties presented in **Section 3.4.9.3.** – presents fluid properties
	2. Exclusion of a background gradient to maximize up dip plume movement	**Section 3.5.5, Page 3-77** "In order to maximize the amount of horizontal movement in the 10,000-year time frame, no background groundwater velocity is used for the low specific gravity model cases. The only driving force for plume movement is buoyancy due to the density contrast between the waste and formation fluid."
J. Document the assumptions used in the high density waste plume demo		**Section 3.5.5, Page 3-76**
	1. High-end of density range compared to formation fluid	**Section 3.5.5, Page 3-76** "The High Specific Gravity Plume is heavier than the formation fluid and therefore will move down-dip or eastward due to buoyancy effects." **Section 3.4.9.3.** – presents fluid properties
	2. Use of a background gradient to maximize the down dip movement	**Section 3.5.5, Page 3-76** "In order to project the maximum amount of down-dip plume movement, the High Specific Gravity Plume case for each injection interval is run with a natural background

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		groundwater velocity of 1.62 feet per year to the south."
K. Document the assumptions used in the vertical diffusion demo		
	1. Describe the depth, w/i the inj. interval, used as the starting point for the max. vertical diffusion movement	**Section 3.7.2.2 Pages 3-98 to 3-101, Figure 3-35 and Appendix 3-9** The depth used for the starting point of the vertical diffusion movement corresponds to the shale aquitard layer overlaying the Frio E&F.
	2. Specify the max. vertical movement used for the no migration demo into intact strata and the appropriate mud-filled or brine filled wellbore	**Section 3.7.2.2, Page 3-101 and Table 3-10** The maximum predicted overall vertical injectate incursion is predicted to be less than 340 feet for the most mobile (pyridine) contaminant modeled.
	3. Describe the method selected to determine the max. vertical diffusion	**Section 3.7.2.2, Page 3-101** Model described in **Appendix 3-4.**
	a. List the vertical diffusion distances for each waste constituent and calc. used for determining the max. vertical diffusion distances	**Pages 3-112 to 3-113** present an example calculation of vertical diffusion distance **Table 3-12** provides diffusion distances for constituents of concern.
	b. Justify use of a worst case constituent and how it was applied in the demo	**Page 3-113 and Table 3-12** State that the most mobile molecule is thallium has a vertical diffusion distance of 189 feet.
	c. Apply a 1000' vertical diffusion distance and do not document the free water diffusivity coefficient for the various constituents	**NA –** the distance from top of Frio E&F Sand to top of Injection Zone exceeds 1,000 feet
	(i) Facilities w/brine-filled APs may be required to make additional diffusion calc. if specific circumstances exist	**NA**

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
L. Results-Clarify the movement of waste from inj. operations will not result in the vertical movement of waste from the inj. zone or laterally w/i the inj. zone to a point of discharge or interface w/a USDW		**Section 3.7.2.2, Page 3-101** "A minimum of 635 feet of net shale (out of a total of 1,430 feet of sand and shale) is present within the Frio Containment Interval, between the top of the Frio E&F Sand Injection Interval and the top of the Frio Injection Zone. Based on these values, it is demonstrated that the injectate will be contained within the lower portions of the Frio Containment Interval and will not migrate vertically upward out of the Frio Injection Zone over the 10,000-year evaluation period."
	1. Total vertical movement of waste from inj. operations and diffusion	**Section 3.9 page 3-118** "There is no vertical permeation of fluids out of the Frio and Vicksburg Injection Zone. The maximum amount of vertical permeation of fluids into the aquiclude immediately overlying the Frio E&F Sand will not exceed 15.6 feet."
	2. Document the max. pressure buildup	**Figure 3-40 and 3-46** for Frio E&F **Figure 3-37 and 3-43** for Frio A/B/C Sand
M. Document any convergence or material balance errors and demonstrate values are insignificant		**N/A**-Analytical Models Used- DuPont Model Package
N. Document the model grid and cell sizes are appropriate for demonstration		**N/A**-Analytical Models Used- DuPont Model Package
	1. Discuss how the grid orientation, cell size, etc. was selected	**N/A**-Analytical Models Used- DuPont Model Package

XX. PLOTS	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Document the plotting program used to illustrate model results accurately depicts the model output and does not distort the plume boundary	**Section 3.3, Page 3-4** "*DuPont Basic Plume Model* output data (.plt plotting files) are imported to Microsoft EXCEL®. A Microsoft EXCEL® "macro" is then used to prepare geographically referenced (and scaled) x,y "comma-delimited" data files from the model output .plt file arrays. The output files are then posted in Golden Software, Inc.'s Surfer® 13 package. For the Sasol Greens Bayou Plant, plume perimeter plots are overlain on a digital Tobin International, Ltd basemap." "*DuPont 10,000-year Waste Plume Model* output data (.out plotting files) are prepared through a FORTRAN conversion routine available on a PC computer. The FORTRAN conversion routine creates a Surfer GS ASCII GRD file in ASCII format for each model time step. This scaled x,y,z "comma-delimited" grid file from the model output .out file arrays file is then contoured in Golden Software, Inc.'s Surfer® 13 contouring package."

XX. PLOTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
B. Provide an outline of the operational plume, up dip and down dip plumes overlain on a structure map of the inj. interval		**Figures 3-73 to 3-77** Present the outline of the operational plumes on structure and isopach maps.
	1. Include an outline or overlay of the grid area	**NA**

XXI. SENSITIVITY ANALYSIS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Perform a sensitivity analysis in order to determine the effect of uncertainties associated w/model parameters 40CFR§148.21(a)(6); Preamble to the July 26, 1988, Final Rule for 40CFR Part 148, page 28129		**Section 3.8, Page 3-117. Appendices 3-1 to 3-5**
	1. Identify areas where uncertainty is present in the geologic description or reservoir characterization	**Section 3.8 page 3-117** "The model is more sensitive to decreases than to increases in sand thickness." "The model is more sensitive to decreases in sand permeability than to increases in sand permeability." "The model is more sensitive to increases in sand compressibility than to decreases." "The models are more sensitive to increases in confining shale compressibility and permeability than to reduction in these parameters." **Appendices 3-1 to 3-5**
	2. Determine a likely range of values and perform sensitivity analyses which would	**Section 3.4** – parameter selection based upon conservative values

XXI. SENSITIVITY ANALYSIS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	address the impact of the uncertainty, if applicable	**Section 3.8 page 3-117** Discusses sensitivity of applicable for parameters.
	a. Assign reasonably conservative parameters to maximize the pressure buildup and waste movement using appropriate estimation techniques and testing protocols 40CFR§148.21(a)(2)	**Section 3.8 page 3-** "By selecting the conservative end of the value or certainty range for each model, contaminant transport and pressure buildup has been over estimated in the model results (see Section 3.5). "

XXII. CONE OF INFLUENCE (COI)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Define the minimum COI- 40CFR§148.20(a)(2)(i)		**Section 4.0 -** Area of Review
	1. Include all COI eq., calc., and values assigned to the various eq. parameters	**Section 4.3 pages 4-6 thru 4-10** provides equations and calculations used to determine the COI
	a. Demonstrate the assigned values are conservative, i.e., brine-filled wells, mud-filled wells, minimum mud weight	**Section 4.3, Page 4-7** values assigned were conservative and based on off data review of all wells in the AOR.
	2. Overlay the COI contour from the max. pressure buildup demo. On a map to illustrate which wells are located w/i COI, if applicable	Modeled Sealed Fault Cases are presented to year end 2050 in the following figures: **Frio A/B/C Sand Figures 3-36 and 3-37** **Frio E&F Sand 3-39 and 3-40** Modeled Open Cases are presented to year end 2050 in the following figures:

XXII. CONE OF INFLUENCE (COI)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Frio A/B/C Sand Figures 3-42 and 3-43 **Frio E&F Sand 3-45 and 3-46** **Table 4-2** – contained the COI pressure buildups for each interval and each case (Open or Sealed Fault)
	a. Pressure contour frequency should allow reviewer to easily est. the max. pressure buildup at each AP location, if pressure buildup info is not available elsewhere in the document	Pressure contour interval in 2 psi in black bold lines.
B. Skeleton type wellbore schematics should be provided for each AP located w/i the COI. The wellbore schematics should include:		**Appendix 4-2** provides schematics for AP's in the COI
	1. Unique AP number	**Appendix 4-2, Tables 4-3a**
	2. Well name and number	**Appendix 4-2, Tables 4-3a**
	3. Well location	**Appendix 4-2, Tables 4-3a**
	4. Name of operator	**Appendix 4-2, Tables 4-3a**
	5. Well status	**Appendix 4-2, Tables 4-3a**
	6. Basic well drilling and construction info. critical to the well's evaluation, e.g., total depth, hole sizes, casing size and setting depth cementing info, plug depths, mud weights, etc.	**Appendix 4-2, Tables 4-3a**
	7. Operators may also include additional info to expedite the review. This data may include:	**Appendix 4-2, Tables 4-3a**
	a. Reference depths	**Appendix 4-2, Tables 4-3a**
	b. Well elevation	**Appendix 4-2, Tables 4-3a**
	c. Regulatory interval depths: USDW, confining zone, inj. zone, and inj. interval	**Appendix 4-2, Tables 4-3a**

XXIII. AREA OF REVIEW (AOR)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Describe the AOR used in the demonstration 40CFR§148.20(a)(2)(i)		
	1. At a minimum, use a 2-mile radius around the well(s)	**Section 4.1 , page 4-1** "For the Sasol Chemicals (USA), LLC Greens Bayou Plant, the radius of the cone of influence in each injection interval was determined based on the reservoir mechanics modeling (Section 3.0) and remains less than 2.5 miles for both the Frio E&F Sand Injection Interval and the Frio A/B/C Sand Injection Interval."
	2. Specify a larger AOR based on the COI, if necessary	**Section 4.1 pages 4-1 thru 4-3** "For the Sasol Chemicals (USA), LLC Greens Bayou Plant, the radius of the cone of influence is less than two miles. Accordingly, the fixed 2.0-mile radius for the Area of Review applies. However, in this 2020 HWDIR Exemption Petition Reissuance request, in order to provide a more conservative approach, a more stringent, fixed 2.5-mile radius is used for the Area of Review." Extended Area of Review based on overly conservative operational plume modeling through year-end 2050
B. Locate and identify all APs located w/i the larger of the COI or AOR using acceptable protocol 40CFR§148.20(a)(2)(ii)		**Section 4.4.1 page 4-11 and Table 4-3a** provides all AP's in the 2.5-mile Area of Review. Search protocol included in **Appendix 4-1**

XXIII. AREA OF REVIEW (AOR)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Table 4-3b - provides all AP's in the Extended Area of Review.
	1. Use a unique numbering system so there are no duplicate AP numbers	**Table 4-3a, Table 4-3b, Appendix 4-1**
	2. Include sidetracked or abandoned wellbores w/i a current completion or plugged well	**Table 4-3a, Table 4-3b** **Appendix 4-2 and Appendix 4-3**
C. Ascertain the condition of all APs located w/i the larger of the COI or AOR that penetrate the inj. zone or confining zone 40CFR§148.20(a)(2)(ii)		**Table 4-3a, Table 4-3b** **Appendix 4-2 and Appendix 4-3**
	1. Use acceptable protocol	**Appendix 4-1** provides Artificial Penetration Protocol
	2. Identify all wells w/i the AOR and assign a unique AP numbering system	**Table 4-3a, Table 4-3b** **Figure 4-5 –** includes wells in the AOR (AP) and Extended AOR (EP)
	a. Document any water wells that penetrate the confining zone	**NA**
	3. Verify the well status of any active or temporarily abandoned wells	**Section 4.4, Page 4-11** **Appendix 4-1** **Tables 4-3a and 4-3b** All wells status's have been checked and updated since the last petition renewal.
D. Demonstrate that all wells are properly constructed or plugged to prevent the migration of waste from the inj. zone based on the max. pressure buildup demo 40CFR§148.20(a)(i)-(iii)		**Table 4-3a, Table 4-3b, Table 4-4** **Appendix 4-2, Appendix 4-3,** **Appendix 4-4** provides a list of APs that may come into contact with any plume as well as well records for these wells.
E. Provide sufficient well records that are grouped and separated for each well (Tabulation of AP well data not required)		**Appendix 4-2, Appendix 4-3,** **Appendix 4-4**
	1. Level of documentation required for each well is dependent on whether the well penetrates the confining zone, inj. zone, or inj.	**Table 4-3a and Appendix 4-2 –** list of APs in AOR and well records.

XXIII. AREA OF REVIEW (AOR)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	interval and if the well is located w/i the COI or waste plume	**Table 4-3b and Appendix 4-3 –** list of APs in Extended AOR and well records. **Table 4-4 and Appendix 4-4 –** list of APs in long-term plumes and well records.
	2. Documentation may include scout tickets log headers, etc. to verify the location of plugs, casing, mud weights, etc.	**Table 4-3a and Appendix 4-2 –** list of APs in AOR and well records. **Table 4-3b and Appendix 4-3 –** list of APs in Extended AOR and well records. **Table 4-4 and Appendix 4-4 –** list of APs in long-term plumes and well records.
	3. Identify all wells that are not constructed or plugged to satisfy the no migration standard	**Table 4-3a, Table 4-3b** **Table 4-4 –** listing of construction and plugging details. **Appendix 4-2 and 4-3** **Appendix 4-5** -well records and schematics
	a. Provide corrective action plan for any such wells 40CFR§148.20(a)(2)(iii)	**NA-** No Corrective action is necessary. All wells pass migration evaluation where it is applicable
	4. Use tabs to separate blocks of well records to facilitate record review	All Records are Submitted electronically. They are separated by Appendices. Within the Appendices, the records are identified as individual PDF's for each Artificial Penetration Number. **Appendix 4-2** (within AOR), **Appendix 4-3** (within Operational Plume), **Appendix 4-4** (within Long-term Plume)

XXIV. WASTE PLUME BOUNDARIES		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Locate and identify all APs located w/i the 10,000-year waste plumes (Tabulation of AP well data is not required)		**Table 4-4, Appendix 4-4** Artificial Penetrations within the Modeled Long-Term Plume track includes AP's in the 10,000-year plume
	1. Overlay the composite plume on a base map	**Figure 4-6 –** Contains the outline extent of the Operational Plume and Long-term High Specific and Low Specific gravity plume **Figure 3-73 –** contains the plumes all one map. Identified by colour
	2. Use a unique AP numbering system so there are no duplicate AP numbers	**Table 4-4, Appendix 4-4**
	3. Include sidetracked or abandoned wellbores w/i a current completion or plugged well	**Table 4-4, Appendix 4-4**
B. Ascertain the condition of all APs located w/i the 10,000-year waste plumes that penetrate the injection zone		**Table 4-4** **Appendix 4-4**
	1. Use acceptable protocol	**Appendix 4-1** presents the Artificial Penetration Protocol
	2. All wells outside the AOR, but w/i the composite plume boundaries should be identified and assigned a unique AP number	**Figure 4-6 -** Contains the outline extent of the Operational Plume and Long-term High Specific and Low Specific gravity plume. **Figure 4-7 –** Detailed Location map of the Clinton Dome is provided for Clarity along with the **Table 4-4 and Appendix 4-4**
	3. Verify the well status of any active or temporarily abandoned wells	**Table 4-4, Appendix 4-4** – all wells were checked in the Texas Railroad Commission via specific API number for current status.

XXIV. WASTE PLUME BOUNDARIES		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
C. Demonstrate these wells are properly plugged or constructed so that no waste would migrate from the inj. zone due to buoyancy or molecular diffusion in an AP – 40CFR§148.20(a)(1)		**Section 4.6, Table 4-4 and Appendix 4-2 –** All wells that penetration the injection interval pass the evaluation for No-Migration (far right column on Table 4-4)
	1. Brine filled wellbores do not pass the no migration standard if located w/i a buoyant plume	**NA-** no wells in the 10,000-year plume are brine filled
D. Provide sufficient well records that are grouped and separated for each well (AP summary tables are not required)		**Appendix 4-2** (w/i AOR) **Appendix 4-3** (w/i Operational Plume) **Appendix 4-4** (w/i Long-term Plume)
	1. Level of documentation required for each well is dependent on whether the well penetrates the confining zone, inj. zone, or inj. interval and if the well is located w/i the COI or waste plume	**Appendix 4-2** (within AOR), **Appendix 4-3** (within Operational Plume), **Appendix 4-4** (within Long-term Plume)
	2. Documentation may include scout tickets, log headers, etc. to verify the location of plugs, casing, mud weights, etc.	**Appendix 4-2** (within AOR), **Appendix 4-3** (within Operational Plume), **Appendix 4-4** (within Long-term Plume)
	3. Identify all wells that are not constructed or plugged to satisfy the no migration standard	**Table 4-3a, Table 4-3b, Table 4-4 0** identify construction and plugging for each well
	a. Provide corrective action plan for any such wells – 40CFR§148.20(a)(2)(iii)	**Section 4.6 pages 4-35 thru 4-39** provides the modeling requirements for wells requiring further evaluation for the no migration standard. **NOTE:** no corrective action is required. All wells pass the No-migration evaluation.
	4. Use tabs to separate blocks of well records to facilitate record review	All Records are Submitted electronically. They are separated by

XXIV. WASTE PLUME BOUNDARIES		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
		Appendices. Within the Appendices, the records are identified as individual PDF's for each Artificial Penetration Number. **Appendix 4-2** (within AOR), **Appendix 4-3** (within Operational Plume), **Appendix 4-4** (within Long-term Plume)

XXV. Implementation and Compliance Section		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
A. Describe documentation in place at the facility that allows verification of compliance with no migration petition approval conditions		**Section 6-3, Pages 6-11 thru 6-17** **Appendices 6-2, 6-3, and 6-4**
B. Note: Documentation maintained for UIC permit compliance may not be sufficient for the no migration petition compliance		**Section 6-3.4, Pages 6-14 thru 6-15** **Appendices 6-2 and 6-3** In addition to UIC Permit Compliance, Sasol monitors the Specific Gravity Waste in accordance with Approved Petition Condition No. 4. The SG is measured once a day and a three whole calendar month volume weighted SG is calculated, documented and reported to the EPA on an annual basis.
	1. Provide a simple waste stream flow diagram	**Figure 6-2** – Process Flow Diagram
	a. Illustrate sampling points and metering equipment	**Figure 6-2** – Process Flow Diagram
	2. Waste stream density or specific gravity compliance	**Section 6.3.4, Pages 6-14 thru 6-15** **Appendix 6-3** – Compliance Program

XXV. Implementation and Compliance Section		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED
	a. Describe how the facility will comply with petition requested range	**Section 6.3.4, Pages 6-14 thru 6-15** **Appendix 6-2 –** Specific gravity Measurements **Appendix 6-3 –** Specific Gravity Compliance Program
	(i) Records maintained at the facility should list the density/specific gravity range at the referenced temperature	**Section 6.3.4, Pages 6-14 thru 6-15** **Figure 6-3** **Appendix 6-2 –** Specific gravity Measurements **Appendix 6-3 –** Specific Gravity Compliance Program
	b. Describe any temperature compensation or correction methods, if applicable	**Appendix 6-2, Section 6-2.1, Page 2** **Appendix 6-2, Section 6-2.2, Page 3**
	(i) Include an example of the temperature correction process if completed manually	**NA –** temperature compensation is performed automatically
	3. Describe the instrument and measurement methodology	**Section 6.3.1, Pages 6-11 thru 6-12** **Appendix 6-2** provides the Specific Gravity Measurement Procedures -Sasol Chemicals (USA), LLC Greens Bayou Plant
	4. List the measuring and metering equipment calibration schedule	**Appendix 6-2, Appendix 6-3** provides the Specific Gravity Measurement Procedures – Sasol Chemicals (USA), LLC Greens Bayou Plant

USE OF REASONABLY CONSERVATIVE VALUES

The "reasonably conservative values" term is discussed in the Preamble to the July 26, 1988, Final Rule for 40CFR Part 148, page 28129. Region 6 allows the use of reasonably conservative or estimated values when site specific data is unavailable or limited- 40CFR§148.21(a)(5). The demonstration should include supporting information from literature or other sources to support these values. The reviewers will establish suitable conservative values, resulting in the protection of human health and the environment, during the petition evaluation. Sensitivity analysis or selection of some values may be more sharply defined because of the availability of site specific or field data.

MODIFICATION

The regulations contained in 40CFR§148.20(f) allow for modification to an approved exemption to include additional waste or wastes. The modification application must demonstrate the requested wastes behave hydraulically and chemically in a manner similar to previously included wastes and will not interfere with the containment capability of the injection zone.

REISSUANCE

The regulations contained in 40CFR§148.20(e) allow for reissuance of an approved exemption to modify any conditions placed on the exemption. The reissuance demonstration must also meet the no migration criteria.

PUBLIC NOTICE

EPA will issue a public notice – 40CFR§148.22(b), with a minimum 45 day public comment period required by 40CFR§124.10(b)(1) for all proposed decisions. Should EPA decide to hold a public hearing, a minimum 30 day public notice will be given prior to the hearing- 40CFR§124.10(b)(2).

FINAL DECISION

EPA will publish final decisions in the Federal Register as required by 40CFR§148.22(b)

PETITION CONDITIONS

In accordance with 40CFR§148.20(d)(2), Region 6 typically requires certain annual monitoring placed as a condition of petition approval.